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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/534,817

05/13/2005

Kia Silverbrook

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SILVERBROOK RESEARCH PTY LTD
393 DARLING STREET
BALMAIN, 2041
AUSTRALIA

EXAMINER

STEPHENS, JUANITA DIONNE

ART UNIT

PAPER NUMBER

2853

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
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3 MONTHS

03/27/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/534,817

Applicant(s)

SILVERBROOK, KIA

Examiner

Juanita D. Stephens

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on Application filed 5/13/2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-47 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 10,24,37 and 45-47 is/are allowed.
- 6) ☒ Claim(s) 1-9,11-23,25-36 and 38-44 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 May 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>3/11/07, 11/13/06, 5/13/05</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Information Disclosure Statement

1. Acknowledgement is made of the Information Disclosure Statement filed 3/11/2007, 11/13/2006 and 5/13/2005.

Specification

2. The disclosure is objected to because of the following informalities:
The "CROSS-REFERENCE TO RELATED APPLICATIONS" section is missing.
Appropriate correction is required.

Claim Objections

3. Claims 6, 7, 9, 13, 21, 23, 42, 43, and 44 are objected to because of the following informalities

In claim 6, line 4 delete "a".

In claim 7, line 5 delete "the".

In claim 9, line 3 replace "a bubble" with --said bubble--. (The recitation of "a gas bubble" was recited in claim 1).

In claim 13, line 5 delete "a".

In claim 21, line 5 delete "the".

In claim 23, line 3 replace "a bubble" with --said bubble--.

In claim 42, line 2 replace "the chamber" with --a chamber--.

In claim 43, line 2 replace "the chamber" with --a chamber.

In claim 44, line 2 replace "the chamber" with --a chamber.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1-3, 6-7, 9, 14-17, 20-21, 23, 29-30, 33-34, 36, and 42-44 are rejected under 35 U.S.C. 102(b) as being anticipated by Silverbrook (US 6,019,457).

Silverbrook discloses a method of ejecting a drop of a bubble forming liquid from a printhead, and a printer system incorporating a printhead (Fig. 12 and 17) comprising: **1)** a structure (overcoat 142) being less than 5 microns thick (col 8, Ins 65-66; col 9, Ins 8-10), **2)** a plurality of nozzles (nozzle tip 111) (col 8, In 66-col 9, In 1), **3)** at least one respective heater element (120) corresponding to each nozzle (Fig. 12), **4)** wherein each heater element is arranged for being in thermal contact with a bubble forming liquid (ink 106), **5)** each heater element configured to heat at least part of the bubble forming liquid to a temperature above its boiling point to form a gas bubble therein thereby to cause the ejection of a drop of the bubble forming liquid through the nozzle corresponding to that heater element, **6)** being configured to support the bubble forming liquid in thermal contact with each said heater element, **7)** a page-width printhead (col 2, Ins 19-20), **8)** wherein each heater has an actuation energy of less than 500 nanojoules (nJ) (col 19, Ins 8-10), **9)** configured to receive a supply of the bubble forming liquid at an ambient temperature, wherein each heater element is configured such that the energy required to be applied thereto to heat said part to cause

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the ejection of said drop is less than the energy required to heat a volume of said bubble forming liquid equal to the volume of said drop, from a temperature equal to said ambient temperature to said boiling point, **10**) wherein the bubble which each heater element is configured to form is collapsible and has a point of collapse, and wherein each heater element is configured such that the point of collapse of a bubble formed thereby is spaced from the heater element (as shown by the shape of the heater element 120 in Fig. 10-12), **11**) wherein each nozzle has a nozzle aperture and defines an axis extending through the nozzle aperture, wherein the point of collapse is disposed on the axis and wherein the element (120) is configured so that the element is spaced from the axis (as shown in Figs. 12 and 17).

Silverbrook discloses the method of claims 33-34, 36, and 44 as discussed above with respect to the apparatus

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 4-5, 18-19, 28, 31-32, and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Silverbrook (US 6,019,457) in view of Kubby (5,706,041).

Silverbrook discloses a method of ejecting a drop of a bubble forming liquid from a printhead, and a printer system incorporating a printhead (Fig. 12 and 17) comprising:

1) a structure (overcoat 142) being less than 5 microns thick (col 8, lns 65-66; col 9, lns

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8-10), **2)** a plurality of nozzles (nozzle tip 111) (col 8, ln 66-col 9, ln 1), **3)** at least one respective heater element (120) corresponding to each nozzle (Fig. 12), **4)** wherein each heater element is arranged for being in thermal contact with a bubble forming liquid (ink 106), **5)** each heater element configured to heat at least part of the bubble forming liquid to a temperature above its boiling point to form a gas bubble therein thereby to cause the ejection of a drop of the bubble forming liquid through the nozzle corresponding to that heater element, **6)** being configured to support the bubble forming liquid in thermal contact with each said heater element, **7)** a page-width printhead (col 2, lns 19-20), **8)** wherein each heater has an actuation energy of less than 500 nanojoules (nJ) (col 19, lns 8-10), **9)** configured to receive a supply of the bubble forming liquid at an ambient temperature, wherein each heater element is configured such that the energy required to be applied thereto to heat said part to cause the ejection of said drop is less than the energy required to heat a volume of said bubble forming liquid equal to the volume of said drop, from a temperature equal to said ambient temperature to said boiling point, **10)** wherein the bubble which each heater element is configured to form is collapsible and has a point of collapse, and wherein each heater element is configured such that the point of collapse of a bubble formed thereby is spaced from the heater element (as shown by the shape of the heater element 120 in Fig. 10-12), and **11)** wherein each nozzle has a nozzle aperture and defines an axis extending through the nozzle aperture, wherein the point of collapse is disposed on the axis and wherein the element (120) is configured so that the element is

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spaced from the axis (as shown in Figs. 12 and 17). Silverbrook further at least teaches that the overcoat is approximately 4 microns thick (col 29, lns 66-67).

Silverbrook teaches the claimed invention, with the exception of **1)** wherein each heater element is in the formed of a suspended beam, having a pair of planar surfaces on opposite sides of the element, that element being suspended such that each of the planar surfaces is in thermal contact with the bubble forming liquid such that the bubble is formed at both of the element surfaces, and **2)** wherein each heater is substantially covered by a conformal protective coating, such that the coating is seamless. Kubby at least teaches wherein each heater element is in the formed of a suspended beam (col 3, lns 50-51) having a pair of planar surfaces on opposite sides of the element, that element being suspended such that each of the planar surfaces is in thermal contact with the bubble forming liquid such that the bubble is formed at both of the element surfaces (abstract; col 4, lns 47-65; col 5, lns 8-16), and wherein each heater is substantially covered by a conformal protective coating (col 4, lns 11-17). It would have been obvious at the time the invention was made to a person having ordinary skill in the ink jet art to modify Silverbrook by providing the heating element as taught to be old by Kubby for the purpose of dissipating heat from the heating element more efficiently, preventing wasted heat from accumulating within the printhead.

The method of claims 31-32, and 41 are disclosed in Silverbrook in view of Kubby as discussed above with respect to the apparatus.

8. Claims 8, 22, and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Silverbrook (6,019,457) in view of Feinn et al. (US 6,543,879 B1).

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Silverbrook teaches the claimed invention, with the exception of having a nozzle density of at least 10,000 nozzles per square cm. Feinn et al. at least teaches an ink jet print head having a nozzle density of at least 10,000 nozzles per square cm (Abstract). It would have been obvious at the time the invention was made to a person having ordinary skill in the ink jet art to have provided Silverbrook with the nozzle density of at least 10,000 nozzles per square cm as taught to be old by Feinn et al. for the purpose of improving resolution.

The method of claim 35 is disclosed in Silverbrook in view of Feinn et al. as discussed above with respect to the apparatus.

9. Claims 11, 25 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Silverbrook (6,019,457) in view of Komuro (US 4,965,594).

Silverbrook teaches the claimed invention, with the exception of the heater being formed on different layers. Komuro at least teaches an inkjet print head having a heater that is formed in a plurality of different layers (col 3, lns 35-65, as seen in Fig. 1). It would have been obvious at the time the invention was made to a person having ordinary skill in the ink jet art to modify Silverbrook by providing a heater that is formed in a plurality of different layers as taught to be old by Komuro for the purpose of enabling drops of different sizes to be ejected in order to produce a gradated recording.

The method of claims 38 are disclosed in Silverbrook in view of Komuro as discussed above with respect to the apparatus.

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10. Claims 12, 26, and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Silverbrook (US 6,019,457) in view of The Fabrication of Reliability Testing of Ti/TiN Heaters (DeMoor).

Silverbrook teaches the claimed invention, with the exception of each heater element is formed of solid material more than 90% of which, by atomic proportion, is constituted by at least one periodic element having an atomic number below 50.

DeMoor at least teaches that it is desirable to use a heater made of Ti/TiN (Ti has an atomic number of 22) in integrated MEMS systems (a thermal inkjet is such a system), because the material provide the advantages of CMOS fabrications (low cost and uniformity) in combination with a very high reliability (see Conclusion). It would have been obvious at the time the invention was made to a person having ordinary skill in the inkjet art to modify Silverbrook by providing the Ti/TiN heater as taught to be old by DeMoor, for the purpose of providing advantages of CMOS fabrication in combination with high reliability.

The method of claim 39 is disclosed in Silverbrook in view of DeMoor as discussed above with respect to the apparatus.

11. Claims 13, 27, and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Silverbrook (6,019,457) in view of Yamashita et al. (US 5,969,005).

Silverbrook teaches the claimed invention, with the exception of wherein each heater element is configured for a mass of less than 10 nanograms. Yamashita et al. at least teaches that the ink is jetted at an output of from 1 to 70 nanograms per droplet to effect recording (abstract, col 30, lns 29-32, lns 38-40; col 31, lns 18-22). It would have

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been obvious at the time the invention was made to a person having ordinary skill in the ink jet art to modify Silverbrook with the output of 1 to 70 nanograms per droplet to effect recording as taught to be old by Yamashita et al. for the purpose of providing a greater surface area of the droplet, thus strongly improving image quality.

The method of claim 40 is disclosed in Silverbrook in view Yamashita et al. as discussed above with respect to the apparatus.

Double Patenting

12. A rejection based on double patenting of the "same invention" type finds its support in the language of 35 U.S.C. 101 which states that "whoever invents or discovers any new and useful process ... may obtain a patent therefor ..." (Emphasis added). Thus, the term "same invention," in this context, means an invention drawn to identical subject matter. See *Miller v. Eagle Mfg. Co.*, 151 U.S. 186 (1894); *In re Ockert*, 245 F.2d 467, 114 USPQ 330 (CCPA 1957); and *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970).

A statutory type (35 U.S.C. 101) double patenting rejection can be overcome by canceling or amending the conflicting claims so they are no longer coextensive in scope. The filing of a terminal disclaimer **cannot** overcome a double patenting rejection based upon 35 U.S.C. 101.

13. Claims 1-9, 11-23, 25-39, and 41-44 rejected under 35 U.S.C. 101 as claiming the same invention as that of claim 1-10, 11-24, 25-39, and 41 of prior U.S. Patent No. 6,824,246 B2. This is a double patenting rejection.

Claims 1 of application is the same as claim 1 of patent; Claim 2 of application is the same as claim 2 of patent; Claim 3 of application is the same as claim 3 of patent; Claim 4 of application is the same as claim 4 of patent; Claim 5 of application is the same as claim 5 of patent; Claim 6 of application is the same as claim 6 of patent; Claim 7 of application is the same as claim 7 of patent; Claim 8 of application is the same as claim 8 of patent; Claim 9 of application is the same as claim 9 of patent; Claim 11 of

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application is the same as claim 11 of patent; Claim 12 of application is the same as claim 12 of patent; Claim 13 of application is the same as claim 13 of patent; Claim 14 of application is the same as claim 14 of patent; Claim 15 of application is the same as claim 15 of patent; Claim 16 of application is the same as claim 16 of patent; Claim 17 of application is the same as claim 17 of patent; Claim 18 of application is the same as claim 18 of patent; Claim 19 of application is the same as claim 19 of patent; Claim 20 of application is the same as claim 20 of patent; Claim 21 of application is the same as claim 21 of patent; Claim 22 of application is the same as claim 22 of patent; Claim 23 of application is the same as claim 23 of patent; Claim 25 of application is the same as claim 25 of patent; 26 of application is the same as claim 26 of patent; Claim 27 of application is the same as claim 27 of patent; Claim 28 of application is the same as claim 28 of patent; Claim 29 of application is the same as claim 29 of patent; Claim 30 of application is the same as claim 30 of patent; Claim 31 of application is the same as claim 31 of patent; Claim 32 of application is the same as claim 32 of patent; Claim 33 of application is the same as claim 33 of patent; Claim 34 of application is the same as claim 34 of patent; Claim 35 of application is the same as claim 35 of patent; Claim 36 of application is the same as claim 36 of patent; Claim 37 of application is the same as claim 38 of patent; Claim 38 of application is the same as claim 39 of patent; Claim 39 of application is the same as claim 40 of patent; Claim 41 of application is the same as claim 17 of patent; Claim 18 of application is the same as claim 41 of patent; Claim 42 of application is the same as claim 10 of patent; Claim 43 of application is the same as claim 24 of patent; and Claim 44 of application is the same as claim 37.

Allowable Subject Matter

14. Claims 45-47, 10, 24, and 37 are allowed.
15. The following is a statement of reasons for the indication of allowable subject matter:

The prior art does not teach, suggest or render obvious the combination of a structure being less than 10 microns thick wherein at least one wall corresponding to each nozzle, the at least one wall being integrally formed with, and extending from, the structure and forming a circumferential perimeter that together with the structure defines a chamber in communication with the respective nozzle for receiving a bubble forming liquid, recited in independent claims 45, 46 and 47. This invention solves the problem of prolonging the life of then heater.

Contact Information

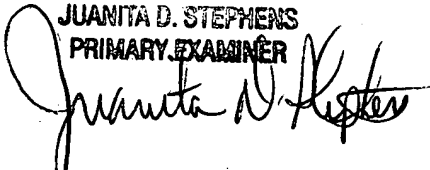
16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Juanita D. Stephens whose telephone number is (571) 272-2153. The examiner can normally be reached on Flex (Monday-Thursday 9:00 am -6:00 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Meier can be reached on (571) 272-2149. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JUANITA D. STEPHENS
PRIMARY EXAMINER



JDS

March 18, 2007

Juanita D. Stephens
Primary Examiner
Art Unit 2853